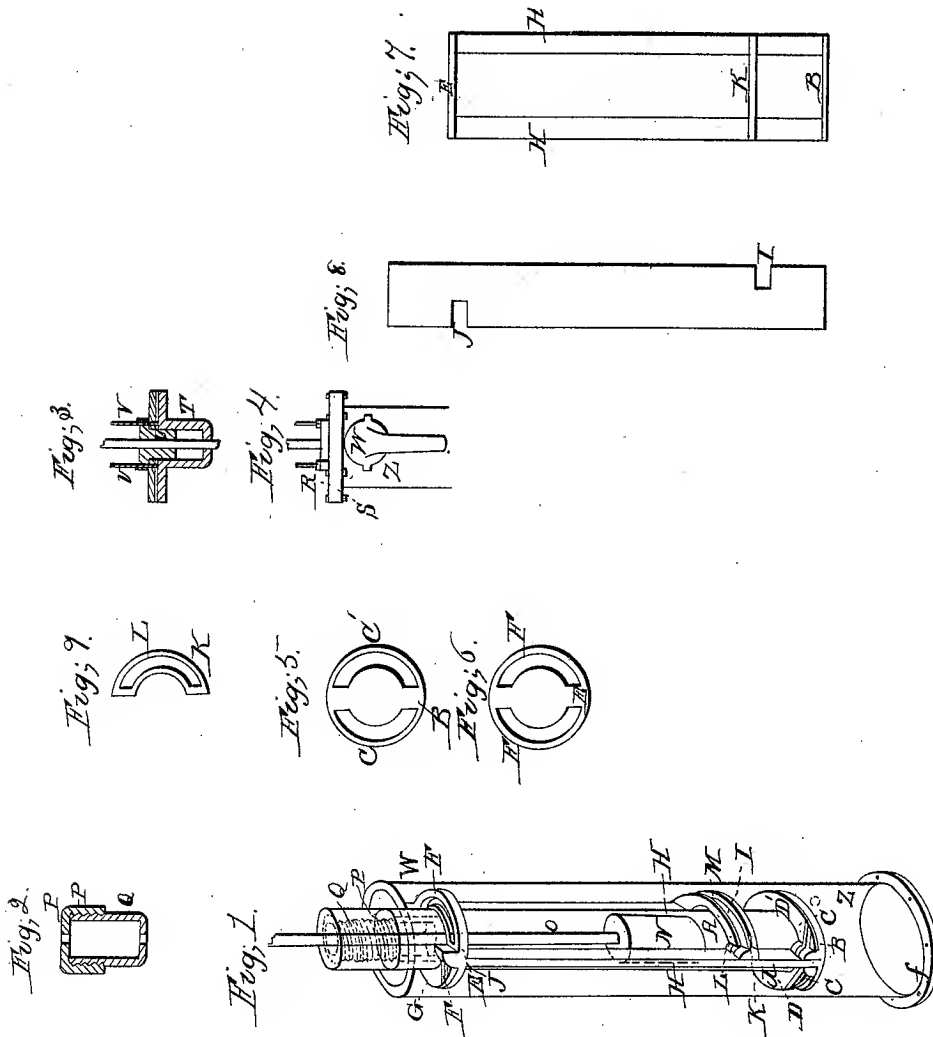


J. Rice,
Force Pump,
N^o 625. Patented Mar. 10, 1838.



UNITED STATES PATENT OFFICE.

JAMES J. RICE, OF SALINA, NEW YORK.

DOUBLE-CYLINDER SUCTION AND FORCE PUMP.

Specification of Letters Patent No. 625, dated March 10, 1838.

To all whom it may concern:

Be it known that I, JAMES J. RICE, of the town of Salina, in the county of Onondaga and State of New York, have invented a new and useful Improvement in the Construction of Pumps for Raising Water, called "Rice's Double-Cylinder Suction and Force Pump," which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

This pump has two cylinders of different diameters one placed within the other leaving a space between them in which the valves work and through which the water rises—the inner one being closed at top and bottom, the outer one being open.

The inner cylinder of the pump, which is marked A Figure 1 in the annexed drawing, is constructed of any convenient length and diameter, according to the situation in which it is to be used, and has a rim B, around it at the bottom of the same diameter as the inside of the outer cylinder; said rim being perforated with two apertures C, C, Fig. 5 for the admission of the water from the well or other place from whence it is to be raised into the pump, each aperture being the segment of a circle of lesser diameter than the rim, one being made in the rim on one side of the cylinder and the other on the opposite side and both covered by hinged valves D', D^a, Fig. 1 of a corresponding shape to said apertures which they alternately open and shut; the valves open upward in the space between the inner and outward cylinders and shut down upon the rim which answers as the seat of said valves when the pump stands vertically.

Near the upper ends of the cylinder and surrounding the same is another circular rim E similar to that just described and perforated in like manner with two apertures F, F Fig. 6 also the segment of a circle one of which F' is covered with a hinged valve G Fig. 1 opening upward and that is placed perpendicularly over valve D^a, of the bottom rim, the other aperture F is left open. (The outer and inner cylinders are represented as being transparent in order to show the valves, pistons, &c.)

Between the two valves and in the center of the solid part of the rims between the valves are placed two partitions H H Figs. 1 and 7 extending from one rim to the other—one on each side and filling the space be-

tween the two cylinders and shutting off all communication from one side to the other.

In one side of the inner cylinder above the bottom rim is an aperture I Figs. 1 and 8 communicating with the inside of said cylinder below the piston. Under the top rim is a similar aperture, Figs. 1 and 8 communicating with the inside of the cylinder above the piston but on the opposite side. Between the two before mentioned circular rims and nearer to the bottom one is a rim K Figs. 1, 7, 9, extending around half of the cylinder from one partition to the other, pierced with a valve aperture L, similar to those above described and covered with a hinged valve m, Fig. 1 of a similar description opening upward.

The piston N, is of the ordinary construction and works tight inside the inner cylinder. The piston rod O works through the packing box P Figs. 1 and 2. This packing box consists of a hollow tube Q open at one end and closed at the other except the aperture for the piston rod. Said tube has a male screw cut on its outer surface at the upper end and is filled with tow or flax or any suitable packing. A cap P with a female screw cut on the inside and an aperture for the piston rod, is screwed on the end of the tube which presses the packing tight around the piston rod. Said packing box fills the end of the inner cylinder and is forced down and held by its gravity and the pressure of the water above the cap forming a shoulder which rests upon the end of the cylinder.

The bore being made in the earth to the depth required and strongly tubed the before described pump is let down to the bottom the piston rod extending to the top and above the surface of the ground where it is worked in the usual manner by lever and hand or any mode or by any power desired. The outer cylinder may form part of the tubing of the bore and may be placed in any desirable situation.

When it is required to place the pump at the surface of the ground a flange f Fig. 1 must be formed around the outer cylinder at the bottom by which to bolt it down to a platform.

The operation of this pump is as follows: When the piston N is raised a vacuum is produced in the cylinder below it, which is instantly filled by the water rising through the valve D'. On the return of the piston

this valve is closed and the water being thus prevented from returning through said valve is forced upward through the valve M and through the aperture F in the upper rim into the tube at the same time creating a vacuum in the cylinder above the piston which is filled by the water rising through the opposite valve D^a on the lower rim B, which valve, as the piston again rises is closed and the water above is forced upward through the valve G in its upper rim into the tube. In this manner the operation is continued until the water is forced to the surface of the ground; or as high as the tubing may extend, where it flows off to any place desired.

When it is required to throw the water to any height in a steady stream the top of the outer cylinder must be closed by bolting a circular plate R Fig. 4 to a circular flange S, projecting at right angles from the cylinder and making the joint tight by inserting packing between said plate and flange. The packing box through which the piston rod passes is, in this case, to be constructed by extending a cup T Fig. 3 from the under side of the circular plate into which the packing is put—the bottom of which cup being pierced with a round aperture for the piston rod to pass through. A stopper U for forcing the packing around the piston rod, flanged on the upper end and pierced with a round aperture for the piston rod to pass through is inserted into a round aperture in the top plate to which plate it is secured and forced down upon the packing by nuts and screws V. The lower rim B of the inner cylinder closes the bottom of the outer cylinder except at the valve apertures. The outer cylinder Z being thus made perfectly tight so as to confine the water is pierced with an aperture for a spout or neck W, to which a tube or hose may be screwed.

The mode of operation is the same as that

before described except that instead of the water rising in a vertical tube and flowing off in the manner first stated it is confined within the cylinder and forced through a tube in the manner of a fire engine to great elevations.

In this pump the pulsation of the column of water arising from the suction and pulsion of the piston is nearly destroyed, without the use of an air vessel or globe. The same arrangement of the working parts as that above described may be used to advantage in the construction of engines for the extinguishment of fires.

By the above novel construction of the pump it is not only rendered stronger and less costly, but from its neat and compact form can be introduced into small bores of great depth below the surface of the ground where it forms the section of the continuous tube; or it may be placed inside the tube at the bottom, or at pumping distance from the surface of the water or in any situation desired and by its use the tube is not liable to be broken as is the case in the use of the pump with a single valve at the bottom and a side tube with a valve through which the water is forced upward.

The cylinder may be surrounded by a square or polygonal trunk of wood of any suitable material with corresponding valves.

The invention claimed by me the said JAMES J. RICE and which I desire to secure by Letters Patent consists in—

The before described construction of the pump with the additional outer cylinder the partition in the spaces between the outer and inner cylinders and the form and arrangement of the valves in the circular rims between said cylinders.

JAMES J. RICE.

Witnesses:

WM. P. ELLIOT,
Jos. B. WOOD.